

### **REMARKS**

This is in full and timely response to the Advisory Action dated December 18, 2003 (Paper No. 121503) and the final Office Action dated September 23, 2003 (Paper No. 915), finally rejecting claims 1 and 3-20, submitted concurrently with a Request for Continued Examination (RCE). Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

By the foregoing amendment, claim 15 was amended as suggested by the examiner to correct dependency. No prohibited new matter was added. Claims 1, 3-8 and 10-20 are currently pending for the Examiner's reconsideration, with claim 1 being independent.

Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

### **Objections Under 35 U.S.C. §132**

Applicant notes that this objection was withdrawn in the Advisory Action dated December 18, 2003 (Paper No. 121503).

### **Rejections under 35 U.S.C. §112**

Claims 6, 7 and 16-19 are rejected under 35 U.S.C. 112, first paragraph. The Office Action at paragraph 7 alleges that "when measured at 270°C" is new matter. Applicants respectfully traverse this rejection.

Applicant notes that this rejection is de facto withdrawn in the Advisory Action dated December 18, 2003 (Paper No. 121503) because, in accordance with paragraph 2 of the Advisory Action, "the melt tension measurement conditions is supported in the original specification is persuasive." As claims 6 and 16 were previously amended to recite that the melt tension is measured at 270°C, this is no longer rejected as new matter. Withdrawal of this rejection is requested.

Regarding the examiner's comments in paragraph 3 of the Advisory Action that "it should be noted that although the specification was amended to add the melt tension measurement conditions, the conditions are still absent from the claims," Applicant traverses this characterization,

and notes that this is not part of any outstanding rejection. Still further, Applicant is not claiming the method of performing melt tension measurements, rather that the value of the melt tension of the crystalline aromatic polyester resin is in the range of from 0.7 to 3.0 g in the presence of a melt tension modifier when measured at 270°C. As the method conditions of measuring melt tension are disclosed in the specification, as acknowledged by the examiner, they are not required to be recited in the claims. Accordingly, Applicant objects to this added requirements that melt tension measurement conditions of using an extrusion rate of 30 mm/min (shear rate: 364.8 sec<sup>-1</sup>) and a haul off rate of 100 mm/min. be added to the claims. Withdrawal of this rejection is requested.

### **Rejections under 35 U.S.C. §103**

Claims 1 to 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 08-174590 ("JP '590") alone, or in view of U.S. Patent No. 5,475,037 to Park et al. ("Park et al. '037"). These rejections are respectfully traversed. Applicants note that claim 2 was previously canceled, and that the rejection was meant to be for claims 1 and 3-20. Claim 9 was previously canceled mooted this portion of the rejection.

Claim 1 recites pre-expanded foam particles formed from a moldable crystalline aromatic polyester resin, said particles having a bulk density in the range of from 0.01 to 1.0 g/cm<sup>3</sup>, crystallinity in the range of from 1 to 8% and a crystallization peak temperature in the range of from 130 to 180°C, wherein the resin contains at least one moiety of a moiety derived from isophthalic acid or a moiety derived from 1,4-cyclohexanedimethanol in a total amount ranging from 0.5 to 10% by weight of the crystalline aromatic polyester resin.

See, for example, the specification at page 6, last paragraph to page 7, line 4 and page 11, line 12 to page 12, line 7.

The crystallization peak temperature is the temperature at which a maximum crystallization speed is reached during a heating process. The crystallization peak temperature is a function of the materials used to form the pre-expanded foam particles. For example, the present specification (page 9, lines 20 to 24) teaches that PET has a crystallization peak temperature that does not reach 130 °C. As claim 1 recites, where the resin pre-expanded foam particle contains at least one moiety of a moiety derived from isophthalic acid or a moiety derived from 1,4-cyclohexanedimethanol in a

total amount ranging from 0.5 to 10% by weight of the crystalline aromatic polyester resin, the crystallization peak temperature is within the range set forth in this claim, and the crystallinity is in the range of from 1 to 8% . See Tables 5 to 7 (pages 72 to 74), Comparative Example 4, and the supporting text.

The concentrations established in the claims go directly to the chemical structure of the claimed moldable crystalline aromatic polyester resin pre-expanded foam particle. This is in contrast to concentrations of elements in a mixture or solution. The claimed range of isophthalic acid or 1,4-cyclohexanedimethanol provides superior results compared to resins having such monomer components outside of such a range.

Accordingly, when heating and fusing the pre-expanded particles to produce a molded foam article, the fusion between the pre-expanded particles is excellent, thereby making it possible to produce a cavity-molded foam article having excellent mechanical strength with the pre-expanded particles having crystallinity in the range of from 1 to 8%. This effectiveness is discussed variously in the specification, for example, page 26, line 23 to page 27, line 17 and at page 36, lines 20-25.

To demonstrate the criticality of the crystallinity range, an executed Declaration by the inventor is submitted concurrently with this Amendment. The inventor declares that pre-expanded particles having a crystallinity in the range of 1 to 8% is critical. None of the cited references discloses or suggests pre-expanded particles having a crystallinity in the range of 1 to 8%, or the advantages resulted therefrom.

According to the Experiment Report (November 7, 2003) attached to the Declaration, the fusion ratio of a molded foam article is 55% when using pre-expanded particles having a 7.4% crystallinity. In contrast, an excellent fusion ratio of a molded foam article is 91% when using pre-expanded particles having a 1.4% crystallinity. This is summarized in the table attached to the Experiment Report. However, the fusion ratio of a molded foam article is a low value of 38%, using pre-expanded foam particles having a crystallinity of 8.5%. Moreover, the fusion ration of a molded foam article made with pre-expanded particles have a crystallinity of 0.5% is not measurable.

As conceded by the Examiner, JP '590 teaches an expanded material which has a bulk density of 0.02 to 0.7 g/cm<sup>3</sup>, but makes no mention of the bulk density of the pre-expanded particles which, prior to being expanded, form the expanded material. See Office Action (Paper No. 9) at

paragraph 4, lines 4-11. There is no reason that a person of ordinary skill in the art would determine that a pre-expanded foam particles should have the presently claimed bulk density based on JP '590, when JP '590 explicitly teaches that the only material that has a bulk density which reads on that of the present claims is already in an expanded state.

Further, claim 1 teaches that the pre-expanded foam particles have "a crystallization peak temperature in the range of from 130 to 180°C." Even in the event that a person of skill in the art would happen to form a pre-expanded foam particles of the claimed bulk density discussed above from application of the teachings of JP '590, it would not naturally follow that the pre-expanded foam particles obtained thereby would have the claimed crystallization peak temperature. The crystallization peak temperature is the temperature at which a maximum crystallization speed is reached during a heating process. The crystallization peak temperature is a function of the materials used to form the pre-expanded foam particles. For example, the present specification (page 9, lines 20 to 24) teaches that PET has a crystallization peak temperature that does not reach 130 °C. Compare this with JP '590, which teaches that PET is the most preferred resin used to form an expanded material (paragraph 0015). As claim 1 recites, where the resin pre-expanded foam particle contains at least one moiety of a moiety derived from isophthalic acid or a moiety derived from 1,4-cyclohexanedimethanol in a total amount ranging from 0.5 to 10% by weight of the crystalline aromatic polyester resin, the crystallization peak temperature is within the range set forth in this claim. Applicants note that JP '590 (paragraph 0015) teaches that compounds such as isophthalic acid and cyclohexane dimethanol can be included to obtain the resin that forms the expanded material. However, JP '590 fails to teach that these compounds merely form a minor part of the resin, but instead teaches that these compounds are used as monomer units that make up a totality of a polymer. A person of ordinary skill in the art would, at best, be motivated to form a resin having a much higher concentration than 0.5 to 10% of the isophthalic acid or 1,4-cyclohexanedimethanol from reviewing JP '590, and would therefore not reach the features of claim 1. More fundamentally, the person of ordinary skill in the art would not be motivated to form a resin material having the crystallization peak temperature in light of the deficient teachings of JP '590 in this respect.

The Office Action makes the sweeping assertion that "it is well known that the crystallinity of PET can be modified by copolymerizing terephthalic acid with cyclohexanedimethanol and/or

isophthalic acid." See Paper No. 9 at paragraph 4, lines 13-15 and at Paper No. 0915 at paragraph 8, lines 21-23. However, both JP '590 and Park et al. '037 do not disclose, teach or suggest that pre-expanded particles have a crystallinity in the claimed range of 1 to 8%. The alleged knowledge of how to modify crystallinity **does not** disclose, teach or suggest the range of desired crystallinity of pre-expanded particles. Accordingly, this rejection does not rise to the level of prima facie obviousness. Withdrawal of this rejection is requested.

As an alternative rejection of claim 1, the final Office Action (Paper No. 0915) combined Park et al. '037 with JP '590. Appellants traverse this rejection. The Office Action asserts that Park et al. '037 teaches a low density foam formed from an amorphous polyethylene terephthalate copolymer via molding of expanded foam particles, and that the copolymer resin can be obtained by copolymerizing isophthalic acid and cyclohexanedimethanol, or mixtures thereof, in an amount of from about 15% to about 50% of the total copolymer formed thereby. Although these percentages (presumed to be measured by weight) are higher than the claimed concentrations in former claim 2, the Office Action asserts that *in the absence of unexpected results* obtained through the claimed concentrations, it would have been obvious to one skilled in the art to modify Park et al. '037 as combined with JP '590 to reach the presently claimed invention.

Still further, in paragraph 1 of the Advisory Action, the arguments presented in Applicant's previous response were entered, yet we not addressed in the Advisory Action, except to argue that Park allegedly "teaches that by incorporating greater than 15 wt% of the co-monomers, an amorphous polyester, rather than a crystalline polyester is obtained. As such, it is believed that a suitable small amount of the aforementioned co-monomers is either inherently disclosed by JP '590, or an obvious optimization to one skilled in the art ...."

Applicant respectfully traverses the rejection in light of the appropriate rule of law concerning optimization of ranges and differences in chemical structures, and the evidence presented in the present specification of the criticality of the claimed concentration (0.5 to 10%) of either 1,4-cyclohexanedimethanol or isophthalic acid and the superior results obtained from such a concentration and the claimed pre-expanded particles having a crystallinity of 1 to 8%. M.P.E.P. § 2144.05 instructs that an invention is not obvious over prior art that discloses differences in concentrations between chemicals in the prior art and in a claimed invention, where there is evidence on record establishing the criticality of the claimed concentration. The present

specification clearly establishes evidence showing the criticality of having between 0.5 and 10% of either 1,4-cyclohexanedimethanol or isophthalic acid in the moldable crystalline aromatic polyester resin pre-expanded foam particles of the invention, as well as 1 to 8% crystallinity of the pre-expanded particles. The claimed concentration is not one selected merely to avoid the prior art *ex post*. Rather, the specification and claims as filed repeatedly suggest the criticality of the claimed parameters.

On page 12, lines 8 to 16, the specification teaches:

"When the total content of the IPA unit and/or CHDM unit is smaller than 0.5% by weight, the effect of inhibiting the crystallization is not exerted. On the other hand, when the content of the IPA unit and/or CHDM unit exceeds 10% by weight, the crystallization rate becomes too slow. In either case, a molded foam article or a laminated molded foam article, having a good appearance, strength, and heat-resistance can not be produced....

Clearly then, the present application teaches that the intended product produced by the present invention can not be produced when the ranges of the IPA (isophthalic acid) or the CHDM (1,4-cyclohexanedimethanol) are outside of the claimed range. This statement is, of course, evidence establishing criticality of the claimed range, and is sufficient to satisfy an obviousness rejection. Further, the statements are supported by experimental evidence provided in the present specification. See Tables 5 to 7 (pages 72 to 74), Comparative Example 4, and the supporting text for experimental evidence supporting these statements. See also inventor declaration, discussed above.

Also, it is respectfully pointed out that the concentrations established in the claims go directly to the chemical structure of the claimed moldable crystalline aromatic polyester resin pre-expanded foam particle. This is in contrast to concentrations of elements in a mixture or solution. M.P.E.P. §2144.09 instructs that an assertion of obviousness based on structural similarity is overcome by proof that the claimed compound provides unexpected results or possesses superior properties. The above discussion clearly explains how the claimed range of isophthalic acid or 1,4-cyclohexanedimethanol provides superior results compared to resins having such monomer components outside of such a range. For at least the above reasons, it is respectfully requested that

the rejections of the claims be withdrawn.

Still further, the final Office Action simply dismisses Appellants arguments without rebuttal. Specifically, "... Applicants' argument to the contrary notwithstanding." See paragraph 8 at page 5, last 2 lines. Accordingly, even if a prima facie case of obviousness was established, as the Examiner has not contradicted the criticality of the claimed range or the superior properties, the obviousness is overcome, and the rejection should be withdrawn.

Still further, "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260, 23 USPQ 2d 1780 (Fed. Cir. 1992). Accordingly, a prima facie case of obviousness has not been established, and the rejection should be withdrawn.

Additionally, dependent claims 3-8 and 10-20, being dependent upon allowable claim 1, are also allowable for the reasons above. Moreover, these claims are further distinguished by the additional features recited therein, particularly within the claim combination.

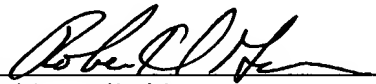
Accordingly, a prima facie case of obviousness has not been presented by the examiner, and the rejection should be withdrawn.

**Conclusion**

For the foregoing reasons, claims 1, 3-8 and 10-20 are in condition for allowance. Accordingly, favorable reexamination and reconsideration of the application in light of these amendments and remarks is courteously solicited. If the examiner has any comments or suggestions that would place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the number below.

Respectfully submitted,

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